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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/088,654

03/14/2002

Stephen Lipson

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2784

7590

02/05/2004

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EXAMINER

LEE, HWA S

ART UNIT

PAPER NUMBER

2877

DATE MAILED: 02/05/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/088,654

Applicant(s)

LIPSON ET AL.

Examiner

Andrew H. Lee

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-8 and 10-13 is/are rejected.
- 7) ☒ Claim(s) 9 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
- a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. **Claims 1-12** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 1 recites "it" twice in line 9 and once in line 21 and the use of "it" makes the claim indefinite in that it is unclear if "it" is referring to the substrate, the planar surface, or the conducting material. For examination purposes, "it" will be assumed to be referring to the conducting material for line 9 and the recorded image for line 21.

3. Regarding **claim 11**, the phrase "such as" renders the claim indefinite because it is unclear whether the limitations following the phrase are part of the claimed invention. See MPEP § 2173.05(d).

4. **Claim 12** recites the limitation "the camera" in the first line. There is insufficient antecedent basis for this limitation in the claim. It appears that the camera is referring to the imaging means where independent claim 1 also recites that the imaging means digitizes the signal. This is in contrast to dependent claim 12 where the processing means, rather than the imaging means, digitizes the signal or the reflected image. For examination purposes claim 12 will be assumed to read as follows:

"A device as claimed in claim 1 in which the said imaging means is connected to said processing means, said processing means calculates the phase of the digitized reflected image in each pixel using a known algorithm."

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. **Claims 1-7, 10, and 12** are rejected under 35 U.S.C. 103(a) as being unpatentable over Nikitin et al (6,628,376) in view of Maule (5,415,842), and Freischlad (5,185,810).

Nikitin et al (Nikitin hereinafter) show an apparatus and method of examining biological, biochemical, and chemical characteristics of a medium comprising:

a thick transparent substrate (14) with a planar surface on which a thin layer of conducting material (15) is deposited (column 7, line 45+), onto which is placed the combination sample (16, 17) being investigated, on said thin layer of conducting material;

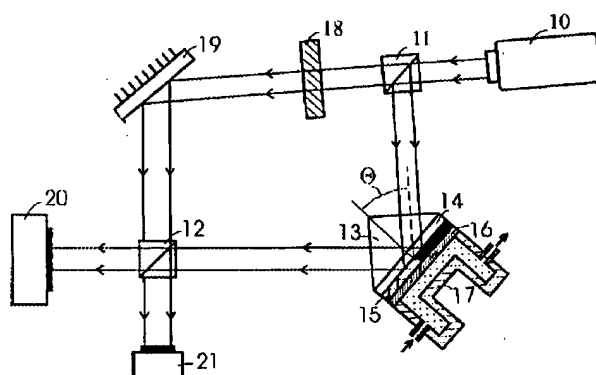
a light source (10) linearly polarized in a predetermined direction (column 7, lines 51+), whose light beam is reflected from said thin layer of conducting material from the side opposite to that on which the sample is placed at an angle substantially equal to that at which the interaction with the plasma resonance produces minimum reflectance intensity (column 7, lines

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66+), the evanescent light field on the far side of the conducting film interacting with the sample, thus modifying the reflected light (column 7, lines 57-65);

an interferometer (column 8, lines 35+) which enables the reflected beam to be compared interferometrically with a reference beam derived from the same source, but not having had any interaction with the sample; and

an imaging means (20, 21) for recording an image of the planar surface in interference with the reference beam.



Nikitin does not expressly say that the incident angle is which the plasma resonance is at maximum. However Nikitin says that the incident angle is at which the reflectance intensity is at a minimum and ideally at zero (column 7 line 57-column 8 line 5).

Maule shows a surface plasmon resonance device wherein Maule teaches that at the angle plasma resonance occurs, there is a dip in reflectance intensity (column 1 lines 23+ and column 3, line 31+). Therefore, from the teaching of Nikitin that the angle should be at minimum reflectance intensity and from Maule's teaching that reflectance intensity drops with plasma resonance, one of ordinary skill in the art would conclude that the angle of incident should be at the angle at which maximum plasma resonance occurs.

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Nikitin also does not expressly show that the image is digitized and a processing means for processing said digitized image to provide an output image, although Nikitin shows an output image.

Freischlad shows a method for optical testing of samples comprising digitizer (10) for digitizing the interferometric image, a processor circuitry (11-25) and a display (26).

At the time of the invention, one of ordinary skill in the art would have combined the apparatus of Nikitin with the apparatus of Freischlad in order to analyze the phase signals from the detectors and to display the data in order to characterize the sample.

For **claim 2**, since the combination sample (16, 17) is placed on the conducting material, the combination sample is placed within up to about 3 wavelengths of the radiation being used for the investigation.

For **claims 3-6**, Nikitin shows that the light source is a He-Ne laser and that it is polarized in the p-plane relative to the sample (column 7, lines 51-53).

For **claim 7**, the embodiment of Figure 2 is in a Mach-Zehnder arrangement.

For **claim 10**, Nikitin shows a CCD (20).

Claim 12, *as understood by the examiner*, Freischlad shows that the processor resolves for phase characteristics for each pixel using a known algorithm.

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8. **Claim 8** is rejected under 35 U.S.C. 103(a) as being unpatentable over Nikitin, Maule, and Freischlad as applied to claim 1 above further in view of Batchelder et al. (5,220,403).

Nikitin shows the apparatus in a Mach-Zehnder interferometer arrangement but Nikitin, Maule, and King do not expressly show the apparatus in a Linnik interferometer arrangement.

Batchelder et al (Batchelder hereinafter) shows that phase changes on reflection from the sample cause changes in the resonance wavelength (column 13, lined 45+) and that either Mach-Zehnder or Linnik interferometers can be used for microscopic examination of materials (column 13, lines 67+).

At the time of the invention, one of ordinary skill in the art would have modified the Mach-Zehnder interferometer of Nikitin to have a different arrangement of a Linnik interferometer in order to use a system with a high aperture for better resolution of images.

9. **Claim 11** is rejected under 35 U.S.C. 103(a) as being unpatentable over Nikitin, Maule, and King as applied to claim 1 above, and further in view of Eppinger (4,818,108).

Nikitin, Maule, and King do not show the image being recorded on a permanent recording material.

Eppinger shows an interferometer where the image is recorded on either a CCD detector or a photographic film.

At the time of the invention, one of ordinary skill in the art would have recorded the images of Nikitin, Maule, and King on a permanent recording material (photographic film) in order to obtain a permanent copy of the phase image that is easily portable and has a lower cost compared to a CCD detector.

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10. **Claim 13** is rejected under 35 U.S.C. 103(a) as being unpatentable over Nikitin et al in view of Maule and Freischlad.

Nikitin et al (Nikitin hereinafter) show a method of examining biological, biochemical, and chemical characteristics of a medium comprising:

placing the sample (16, 17) being investigated onto a thin conducting material (15) which is deposited (column 7, line 45+) on a thick transparent substrate (14);

reflecting (column 7, line 51-column 8, line 19), light beam linearly polarized in a predetermined direction (column 7, lines 51+) from said thin layer of conducting material from the side opposite to that on which the sample is placed, at an angle substantially equal to that at which the interaction with the plasma resonance creates minimum reflectance intensity (column 7, lines 66+), the evanescent field on the far side of the thin layer of conducting material interacting with the sample (column 7, lines 57+), thus modifying the reflected light;

interferometrically comparing said reflected beam with a reference beam derived from the same source, but not having any interaction with the sample (column 8, lines 24+ and column 10, lines 64+);

recording (column 10, lines 64+) an image of a planar surface in interference with the reference beam;

Nikitin does not expressly say that the incident angle is which the plasma resonance is at maximum. However Nikitin says that the incident angle is at which the reflectance intensity is at a minimum and ideally at zero (column 7 line 57-column 8 line 5).

Maule shows a surface plasmon resonance device wherein Maule teaches that at the angle plasma resonance occurs, there is a dip in reflectance intensity (column 1 lines 23+ and column 3, line 31+). Therefore, from the teaching of Nikitin that the angle should be at minimum

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reflectance intensity and from Maule's teaching that reflectance intensity drops with plasma resonance, one of ordinary skill in the art would conclude that the angle of incident should be at the angle at which maximum plasma resonance occurs.

Nikitin also does not expressly show the digitizing and processing of the interference image

Freischlad shows a method for optical testing of samples comprising digitizing the interferometric image (column 5, lines 46+), a processor circuitry (column 5, lines 47+) and a display (26).

At the time of the invention, one of ordinary skill in the art would have combined the method of Nikitin with the method of Freischlad in order to analyze the phase signals from the detectors in order to characterize the sample.

Allowable Subject Matter

11. Claim 9 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

The prior art of record fails to show or to suggest a device for measuring simultaneously the phase at each point in an image formed by light reflected from a sample, in which the phase has been modified by plasma resonance comprising of all the elements as presently claimed wherein the light beam is illuminated annularly in combination with an interferometer.

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Papers related to this application may be submitted to Technology Center (TC) 2800 by facsimile transmission. Papers should be faxed to TC 2800 via the PTO Fax Center located in CP4-4C23. The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 30 (November 15, 1989). The CP4 Fax Center numbers are 703-872-9306 for regular communications and for After Final communications

If the Applicant wishes to send a Fax dealing with either a Proposed Amendment or for discussion for a phone interview then the fax should:

- a) Contain either the statement "DRAFT" or "PROPOSED AMENDMENT" on the Fax Cover Sheet; and
- b) Should be unsigned by the attorney or agent.

This will ensure that it will not be entered into the case and will be forwarded to the examiner as quickly as possible.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew Hwa Lee whose telephone number is (703) 305-0538.

The examiner can normally be reached on M-Th. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frank Font can be reached on 703-308-4881.



Andrew Lee
Patent Examiner
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January 12, 2004/ahl